A RAND NOTE

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Attrition Among First-Term Enlistees

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For nearly a decade, 35-month attrition rates in the volunteer force have exceeded 25 percent.[1] Although that is far less than the 41 percent *annual* turnover rate for males aged 17–22 in the private sector,[2] first-term attrition is nonetheless critical for the military. The first term comprises more than two-fifths of active duty enlistees and supplies essentially all personnel for subsequent terms. Higher attrition has the detrimental effect of reducing this supply pool. Moreover, force modernization has increased the demand for capable, well-trained individuals. This demand must be met despite tighter defense budgets and further decline in the youth cohort; hence, attrition becomes an important variable to control. In addition, it is well known that attrition depreciates recruiting and training investments and disrupts unit cohesion. These negative outcomes are especially troubling when enlistments and reenlistments decline but force strength objectives remain constant or increase.

Still, attrition is not all bad. It provides the flexibility to keep or separate enlistees conditional on their performance, which encompasses such factors as skill proficiency, attitude, potential for leadership, and willingness to accept discipline. The services thus have an opportunity

to identify and retain talented individuals while discharging those who are not productive, who cannot adjust, or who are otherwise unsuited to military life. Understandably, the benefits of attrition must be weighed against its costs.

In this article we are interested in identifying the determinants of attrition behavior of high school seniors and graduates—the population groups most significant for recruiting today's higher-quality force. A research goal is to improve the capability to predict who is likely to stay and who is likely to leave, and offer insight into why attrition occurs.[3] To accomplish this goal, we employ a unique microdata set and specify, a statistical model that analyzes attrition behavior jointly with enlistment.

In the early years of the volunteer force, the most useful attrition indicator was whether an enlistee had completed high school. High school dropouts comprised 40 percent of first-term enlistees and had twice the attrition rate of high school graduates. Military pay, enlistment incentives, and advertising have so improved recruitment that high school graduates now form 90 percent of enlistees. The high school graduate/dropout distinction consequently has little relevance to predicting attrition. Given this change, we concentrate on determining attrition influences among enlistees *with high school diplomas*. Compared with data from previous studies, our data provide a considerably more comprehensive picture of such enlistees.[4]

The Enlistment/Attrition Model

Previous studies analyze attrition behavior among personnel in service but ignore the choice to enlist. This does not create problems if the objective is to predict attrition for enlistees and if the eligibility criteria for enlistment are held constant. But we argue that, in addition to predicting attrition given enlistment, it is valuable to know an enlistment prospect's potential for attrition. An attrition equation estimated strictly on enlistee data will not be satisfactory for predicting prospects' attrition if selectivity bias is a factor. To account for this possibility we estimate a two-equation enlistment/attrition model.

What are some unobserved variables that could give rise to selectivity bias? On the individual side, unobserved variables—variables not present in our data—might include planning ability, information about career aspirations, employment opportunities, personality traits (e.g., willingness to take direction), perseverance, taste for military service, and the perceived quality of military life and work. On the military side, unobserved variables include the individual's productivity in the ser-

vice, the kind of leadership he faces (e.g., drill instructor, unit commander), and budget and manning constraints. As an example of selectivity, the individual's productivity presumably enters his decision to enlist and stay, as well as the service's decision to allow the enlistment and subsequently keep him. In contrast, factors such as budget and manning constraints would presumably be unrelated to the enlistment decision and hence seem unlikely to cause selectivity bias.

The net effect of the unobserved variables on the attrition equation may be controlled statistically by means of a sequential probit model. We estimate such a model with three outcomes: (1) no enlistment, (2) enlistment and attrition, and (3) enlistment and no attrition. Our data base allows us to enter a wide range of variables that might influence both enlistment and attrition.[5] In addition to providing coefficient estimates of the included variables, this model also permits correlation between the error terms in the enlistment and attrition equations. This correlation reflects the association between unobserved variables in the two equations; a significant negative or positive correlation indicates the existence of variables affecting both decisions.

The model specification is consistent with different theoretical approaches to explaining attrition. In a limited sense our approach is "interactionist," in John Faris's terminology. Faris argues that "economic models need to be augmented by including social and social psychological variables such as family tradition, social networks, unit cohesion, vertical integration within the military institution, patriotism, and civic consciousness."[6] But such variables are absent in our data and must be relegated to the enlistment and attrition error terms. Further, the interactionist approach "takes personality, attitudes, and normative attachments as subject to modification through socialization processes"[7]— changes that again are unobserved in our data.

In a related vein, Herbert Baker suggests that youth learn a great deal about themselves and their career preferences as they work at their first jobs.[8] From economic literatur , job matching models examined by Boyan Jovanovic and Louis Wilde suggest that workers may be incompletely informed about job characteristics before a trial period of employment, just as employers are incompletely informed about a worker's productivity.[9] This process of on-the-job discovery, like the other processes involving change over time, may give rise to a small enlistment/attrition error correlation, and hence, little selectivity bias. While our methodology can accommodate these approaches, it is clear that still more data would be required to quantify their respective contributions to the attrition process.

Enlistment and Attrition Outcomes

An asymmetry exists in enlistment and attrition decisions with respect to the relative influence of the individual and the military. Once a potential recruit passes the military's screen—its general and occupation-specific eligibility requirements—the enlistment decision is the recruit's, depending on the individual's characteristics, experience, plans, and attitudes. This is not to suggest that recruiters and job counselors have no influence but only that the decision to enlist is ultimately the individual's. Baker describes that decision:

> Young people, of late students, approach the recruiting station with a low level of self and career awareness. . . . Because of limited work experience, they are unable to relate vocational and avocational interests, aptitudes, and personal goals meaningfully to military career opportunities. . . .
>
> [However,] young people are not always unaware of their own immaturity and lack of career preparation; an important enlistment motivation is the opportunity to test personal abilities and define one's interests.[10]

In contrast to the enlistment decision, both the individual and the service play an active role in the attrition decision. On the basis of the recruit's performance in training and on the job, the service decides whether he should be permitted to complete the full term. Robert Leider, for instance, points out that the service wants to identify and keep high performers and discharge low performers.[11] At the same time, the individual weighs the relative advantages of continuing military service against the civilian alternatives. If the service or the soldier is sufficiently disappointed with the quality of the match, attrition will result.

In summary, the individual chooses to enlist subject to service criteria, but the attrition decision is jointly determined by the individual's evaluation of the service opportunity and the service's evaluation of the individual. Although the asymmetry grows more pronounced in bad recruiting times, it weakens in good recruiting times when excess supply allows the services to be more selective in recruiting.

The Data Base

To analyze enlistment and attrition, we required data on nonenlistees as well as preenlistment and in-service data for a large number of en-

listees, some of whom attrited. However, existing samples of youth have small numbers of enlistees because only a small fraction of seniors and graduates enlist each year.

To overcome this problem, we built a choice-based sample of males aged 17 to 22 from two concurrent surveys.[12] Data on enlistees came from the 1979 DoD Survey of Personnel Entering the Military Service (AFEES), and it was pooled with data on nonenlistees from the National Longitudinal Study of Labor Market Behavior Youth Survey (NLS). Both surveys were given in spring 1979, which ensured comparability, and both included many similar questions, which permitted construction of a common set of variables. Once we had constructed this consistent data base (AFEES-NLS), we asked the Defense Manpower Data Center to merge in the personnel records of the enlistees. This gave us attrition data through 1984.

The AFEES-NLS provides a very large sample of enlistees (4,718) relative to nonenlistees (1,129). This enabled us to perform detailed analyses for seniors and graduates separately, and naturally, only with such a large number of enlistees could we get enough attrition to be analytically useful for both groups. In addition, these data seem well suited for our purposes because 1979 was the leanest recruiting year in the volunteer force era. As a result, the services did little enlistment screening beyond setting basic requirements. This situation strengthens the interpretation of the enlistment results as individual supply behavior. On the other hand, the 1979 cohort of high school graduate enlistees does not appear to be a peculiar group for studying attrition. The 35-month attrition rate for high school degree graduates ranged from 22 to 24 percent among the FY1977–84 cohorts; the FY1979 cohort, at 22.5 percent attrition, fits within this range.

The Findings

We expected to find that similar factors would influence enlistment and attrition—that is, that what makes a person more likely to enlist would make him more likely to stay. But this proved true only for some of the variables we observed. For others, the effects went in opposite directions. While the direction or strength of effects often differed between senior and graduate groups, many variables that were significant in explaining enlistment were insignificant for attrition. Two notable findings are (1) the extremely strong influence of educational expectations on both enlistment and attrition behavior, and (2) the fact that none of the unobserved factors consistently influenced both enlistment and at-

trition behavior, once we controlled for the observed variables.

Our results reveal significant differences in enlistment behavior between seniors and graduates.[13] For seniors, education-related factors were more important while for graduates, employment-related factors had more effect. (Enlistment/attrition regression results are available upon request to the authors.) This difference reflects the segmented nature of the recruiting market. In our data, over 60 percent of the senior class expected to continue their education after high school. In contrast, even if graduates had plans to continue their education someday—and some 40 percent did—they had presently opted to enter the civilian labor market. In that regard, they represent a selected population: in contrast to seniors, working graduates have forgone enlistment immediately after high school and sought civilian employment. Consequently, characteristics that affect seniors' chances of going on to school would be expected to influence them more than factors related to job market participation, while the reverse would be true for graduates.

Enlistment Behavior: Education-Related Factors

Age and AFQT. Older seniors (i.e., 19-year-olds) tend to be slower learners and are less likely to have plans for higher education. Thus, we were not surprised to find that older seniors were more likely to enlist. In contrast, a high AFQT score implies learning proficiency and greater educational potential—qualities that would predispose a senior to higher education. Predictably, seniors with high AFQT scores were less likely to enlist. Neither age as a senior nor AFQT score affected graduate enlistment.

Family income. High-income families are better able to finance a senior's higher education, and seniors from such families were less likely to enlist. This effect was especially strong for seniors who expected more education. Graduates who come from such families might also be less likely to enlist because the family income would give them a cushion while they looked for jobs and established their careers. However, we found no effect of family income on graduates' enlistment behavior. This may reflect their growing independence from parents or may be another instance of selection: seniors who could afford it simply went on to college. Once they were selected out, the volunteer force drew more or less without regard to family income.

Educational expectations. One of the major influences on enlistment behavior was expecting more education, and the direction of that influence is different for the two groups. Seniors who expected more education were less likely to enlist than those who had no such expecta-

tions. However, the reverse was true for graduates: those who expected more education were *more* likely to enlist, and that propensity was greater the higher their AFQT score.

We believe this difference again reflects the selected nature of the two groups. Many seniors who expected to continue their education did so immediately after graduation and were thus absent from our graduate group. However, more than two-fifths of the nonenlisted graduates were expecting further education. They may have been unable to afford going directly to college, changed their minds about further schooling after graduation, or thought on-the-job training would provide adequate skills; however, experience proved otherwise. Many graduates who expected more education had evidently concluded that the military provided better opportunities for meeting their goals than they had found in the civilian labor market.

Enlistment Behavior: Employment-Related Factors

Wage and job tenure. For graduates, higher wages and longer job tenure decreased the likelihood of enlistment. We would expect people who have "better" civilian jobs to find enlistment a less attractive alternative. For seniors, these considerations may be less relevant. When they work, they often hold casual, part-time jobs that do not reflect their potential market earnings or career interests. In our sample, wages had no effect on seniors' decision to enlist, but job tenure reduced their likelihood of enlistment. This suggests that seniors with longer tenure are more satisfied with their civilian job prospects.

In conjunction with the results for education expectations, our findings for seniors and graduates support the Army's strategy that distinguishes two major groups in the recruiting market: the education-oriented and the employment-oriented. These groups also differ in their attrition experience, as discussed below.

Months jobless. To estimate the effects of joblessness, we defined it in two ways: (1) without a job for the last 12 months, and (2) currently jobless, but having worked for some time in the last 12 months. For those who were currently jobless, we also estimated the effects of months since last job.[14]

When graduates had not held a job during the 12-month period, they were more likely to enlist, suggesting a lack of civilian job opportunities for them. However, we found no significant effect for seniors in this position. For them, joblessness may suggest lack of job opportunities, but it may also reflect a decision to concentrate on studies and school activities. The findings for current joblessness were somewhat

ambiguous. It actually decreased the likelihood of enlistment for both seniors and graduates. However, that finding must be considered in conjunction with the number of months jobless. The longer (previously employed) seniors and graduates were jobless, the more their chance of enlisting increased.

Months since school and some college. Months since school as well as time spent in college decreased enlistment probability for graduates. By definition, neither of these conditions would apply to seniors. The effect of months since school suggests career momentum: once established in the civilian labor market, young men either see no need or hesitate to switch to the military. The effect of having some college education suggests a preference for formal schooling, which displaces the motive to enter military service for the training it offers.[15]

Attrition Behavior

The attrition regression included all the variables listed and/or discussed above, plus term of enlistment, service entered, and an indicator for Delayed Entry Program participation. Only three variables strongly affected both seniors and graduates: expectations of more education, amount of time in DEP, and employment instability. The others contributed little to explaining attrition. Analysis also revealed no selectivity bias arising from the unobserved factors.[16]

These results held for the two points at which we tested for attrition effects—6 months and 35 months. These two points recommend themselves for various reasons. During the first 6 months, enlistees receive their basic training (which ranges from 6 to 10 weeks, depending on the service) and begin training in their military occupational specialties.[17] During this 6-month period enlistees become familiar with military life. If they leave by the end of that period, the reason may be that the service found their training performance unsatisfactory and/or they were generally dissatisfied with the military regimen.

This 6-month attrition point has special significance for both the individual and the service. An individual cannot achieve veteran status until he has served at least 181 days of active duty. Having achieved that status, he is entitled to certain benefits when he leaves the service, benefits that entail costs for the Veterans Administration These costs can be avoided if training battalion commanders discharge poor-quality, attrition-prone recruits before the end of 6 months.

After completing his training, an enlistee transfers to the base where he begins his duty assignment. In the months that follow, he becomes familiar with the day-to-day realities of the assignment, learns more skills

on the job, and tries to apply what he was taught in advanced training. All the while, the enlistees and the service accumulate information about each other that will allow them to decide how good a match they have made, and, if necessary, how to resolve any disappointments.[18] For this longer period, we analyzed attrition at the 35-month point.

Although the results were largely consistent at the two points, we limit discussion to the 35-month results. Our enlistee sample was large, but relatively little attrition had occurred at 6 months. Of 2,392 senior enlistees, only 164 left within 6 months; of 2,326 graduate enlistees, 207 left. By 35 months, nearly three times as much attrition had occurred, making us more confident about the statistical results.

Educational expectations. The enlistment analysis showed that the seniors expecting more education were *less* likely to enlist but the graduates were *more* likely to enlist. However, when we look at attrition behavior, both senior and graduate enlistees were *less* likely to leave if they expected more education.

What explains this influence on attrition? It could be that enlistees who expect more education see military educational benefits as a means to finance further education. Or they may see military training and experience as a substitute for further formal education. In the first case, an enlistee would be more likely to stay because he cannot receive maximum benefits without meeting the terms of the contract. In the second case, an enlistee should be more motivated to do well on the job, raising his value to the service and making attrition less likely. Either way, these enlistees have an incentive not to leave.

Another aspect is that persons who expect more education may be better planners or have greater perseverance; that is, education expectations may be related to preexisting attributes associated with lower attrition. This possibility, which would have to be examined with data other than ours, recognizes the viewpoint that different kinds of enlistment incentives draw selectively from different market segments. Bonuses, for example, might draw recruits with more mercenary interests, less perseverance, less well focused career preferences, and less interest in on-the-job training, but this is an empirical question. Faris speculates that "those drawn into the military primarily by marketplace mechanisms are most likely to become disaffected and repelled by the inherently distinctive features of military service."[19] His position would be borne out by a finding of higher attrition for low-wage enlistees, but we find no wage effect on attrition for seniors or graduates. On the other hand, as discussed below, attrition is higher for persons with employment instability. Still, this may not reflect growing disaffection with the

military but rather the continued effect of factors that generated employment instability before enlistment.

Months in the Delayed Entry Program. About 90 percent of enlistees in our sample delayed their service entry by participating in DEP.[20] DEP helped them select the occupation of their choice and a convenient entry data. Because so many enlistees enter through DEP—virtually all seniors—it is perhaps not surprising that DEP participation alone has no significant correlation with attrition. Still, Baldwin and Daula found that DEP participation had a strong negative association with attrition in the Army skills they examined, and Buddin found a negative effect of DEP participation on early (6-month) attrition.[21] However, in our analysis the *number of months* in DEP greater than one was found to have a strong negative effect.[22] The reasons may be that people who stay longer in DEP are more methodical planners, have firmer career preferences, and have been screened more thoroughly by the service. Such enlistees are less likely to be disappointed with their military occupations and to become malcontents.

By entering DEP, enlistees indicate that they are not ready to ship out directly from the enlistment processing station. They may simply have schooling to finish or business to settle and want to choose a convenient date of entry. However, because more valued jobs have longer DEP queues, we believe that the relationship between months in DEP and attrition depends more on occupational interests. In contrast to enlistees who are willing to go right in or to accept any available occupation, those who stay longer in DEP have firmer job preferences and understand more clearly how particular training relates to their career plans. Longer time in DEP may also indicate a screening effect. Because the more valued jobs are more in demand, the service can establish stricter occupational entry criteria to ensure getting the best people into those jobs.

Employment instability. Our measures of employment instability differ somewhat from the measure of joblessness used in the enlistment analysis.[23] Nevertheless, both suggest a lack of civilian job opportunity. That lack, in turn, may result from poor planning, career uncertainty, and/or low productivity. If so, it is not surprising to find that people who apparently lacked civilian opportunities were more likely to enlist but less likely to complete their terms. Those characteristics would make them less likely to have clearly realized career goals, to choose the right military job, and to be productive (hence, valuable to the service).

The effect of unobserved variables. Our statistical model allows for the possibility that unobserved factors such as patriotism, taste for military

life, and productivity jointly influence enlistment and attrition. If uncontrolled, such factors could cause selection bias, mitigating the usefulness of the attrition equation as a means of predicting attrition for enlistment prospects. However, our results show no significant correlation between the unobserved influences on enlistment and attrition decisions. This lack of connection suggests that actual experience in the military dominates whatever factors carry over from enlistment to affect attrition also. So many influences on attrition are unanticipated by both the enlistee and the service at enlistment that they overwhelm the factors that persist from enlistment to the attrition point. Consequently, previous studies that did not control for selectivity bias were probably not far off the mark in terms of the estimated influence of variables they considered for predicting attrition behavior of enlistees and enlistment prospects.
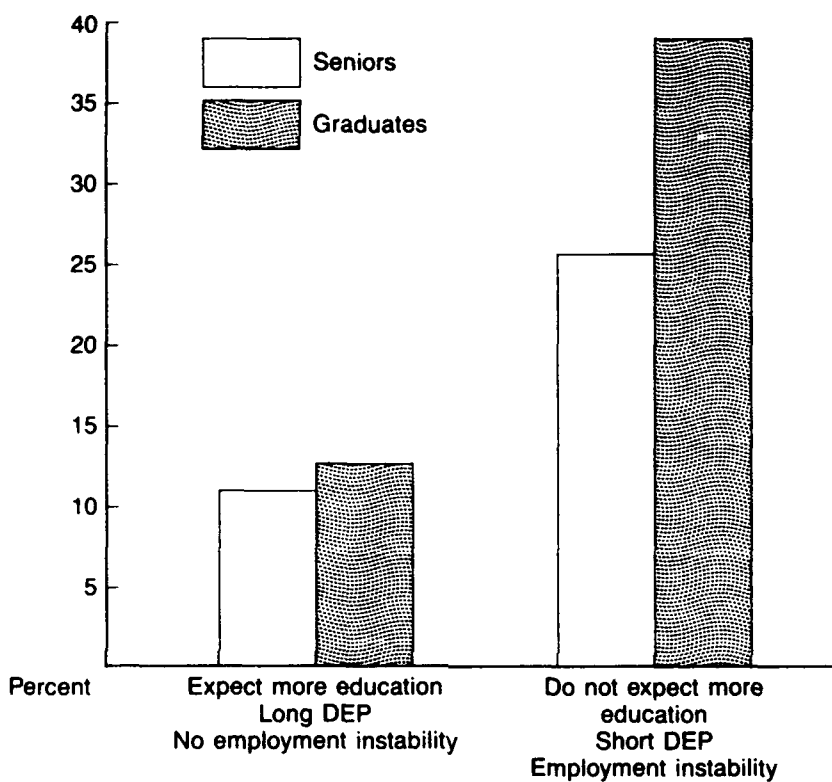
Predicting risk of attrition. We find that a few variables can explain a wide range of attrition risk among enlistees. The primary factors are senior or graduate status, positive or negative educational expectations, short or long participation in DEP, and stable or unstable civilian employment. Figure 1 shows only the extremes for the senior and graduate groups: (1) those who expect more education spend a longer time in DEP and have no employment instability, and (2) those who do not expect more education spend a shorter time in DEP and have unstable employment. (Table 1 gives results for all eight possible combinations of these features.)

In both groups, graduates typically have higher attrition rates than do seniors, and the difference between the highest and lowest risk groups among seniors and among graduates is roughly three-to-one. In comparison, the difference in attrition risk between high school dropouts and high school graduates is known to be two-to-one. Our analysis clearly adds information for distinguishing the range of attrition risk *among* enlistees who graduate from high school—even in comparison with previous research distinguishing attrition *between* graduates and dropouts.

Research Applications

Educational Expectations/Job Stability

The services currently collect information about two of the major influences on attrition—senior versus graduate status and DEP participation—but not about the other two—educational expectations and employment stability. The latter is important mainly for graduates, while education expectations are important for both seniors and graduates. As

Figure 1

Predicted 35-Month Attrition Risk of Enlistees

Percent | Expect more education Long DEP No employment instability | Do not expect more education Short DEP Employment instability

seen in figure 2, seniors have lower enlistment rates (3.9%) than do graduates (5.3%).[24] However, once in the service, seniors also have lower attrition rates (17.7%) than do graduates (23.9%). As shown earlier, expecting more education has an opposite effect on enlistment for seniors and graduates but the same effect on attrition. Among seniors, those who expect more education are less likely to enlist and less likely to leave. Among graduates, in contrast, those who expect more education are more likely to enlist and less likely to leave. For both, attrition is at least a third lower for those who intend to get more education. The attrition rate for seniors who expect more education was 13.7 percent; for those who do not, it was 21.6 percent. The corresponding rates for graduates are 19.2 percent and 30.2 percent.

Based on our results, recruiting strategies aimed at seniors and graduates who expect more education could have a significant payoff. Educa-

Table 1

Attrition Index for Senior and Graduate Enlistees
(Predicted attrition rate in parentheses)

Risk Group	Percent Enlistees in Group Senior	Graduate	6-Month Attrition Senior	Graduate	35-Month Attrition Senior	Graduate
Expect more education Long DEP No employment instability	10	10	100 (.030)	120 (.036)	100 (.109)	113 (.123)
Expect more education Long DEP Employment instability	7	6	137 (.041)	243 (.073)	118 (.129)	189 (.206)
Expect more education Short DEP No employment instability	16	25	140 (.042)	167 (.050)	129 (.141)	159 (.173)
Expect more education Short DEP Employment instability	13	20	193 (.058)	280 (.084)	152 (.166)	232 (.253)
Not expect more education Long DEP No employment instability	11	6	203 (.061)	223 (.067)	163 (.178)	198 (.216)
Not expect more education Long DEP Employment instability	7	4	257 (.077)	393 (.118)	183 (.200)	279 (.304)
Not expect more education Short DEP No employment instability	23	16	270 (.081)	277 (.083)	206 (.224)	244 (.266)
Not expect more education Short DEP Employment instability	13	13	350 (.105)	510 (.153)	233 (.254)	350 (.381)

NOTE: Long DEP is defined as more than three months in DEP for seniors and more than one month for graduates. These are the median DEP lengths for seniors and graduates. Median DEP length for seniors in our data is a function of when the data were collected. Because the AFEES survey was administered in April and May, seniors still had to finish school before entering. Thus, their median DEP is higher than that of graduates.

tional benefits should draw heavily from these groups; and higher enlistments among them would mean increased man-years of service, at least during the first term. Although seniors who expect more education are less likely to enlist, their lower attrition rates should compensate to some extent by providing more man-years. Because graduates who expect more education also have lower attrition rates, the military

Figure 2

How Educational Expectations Affect Enlistment And Attrition Decisions
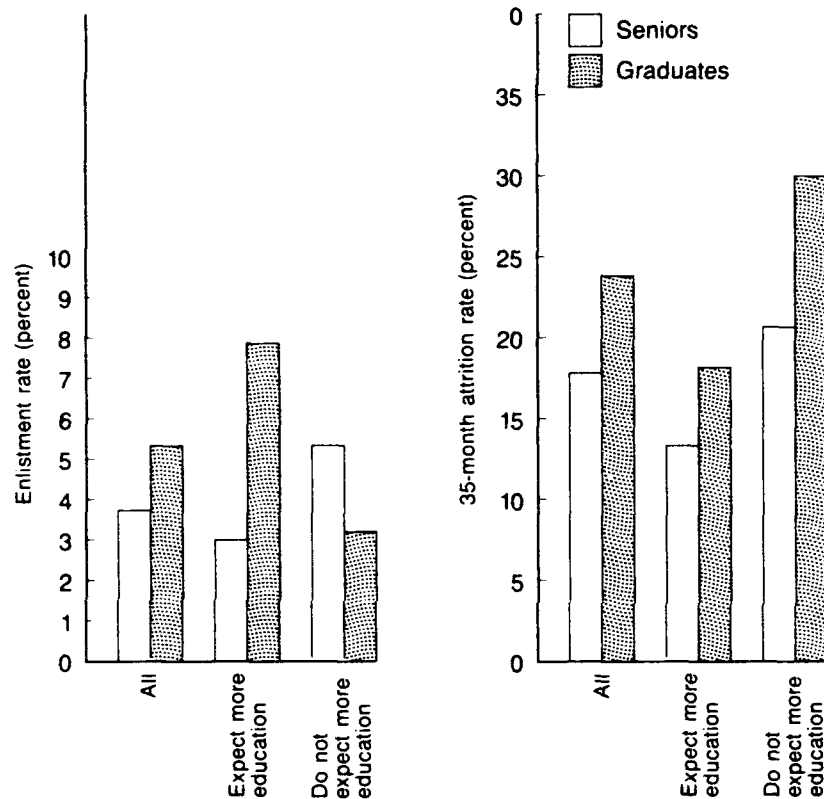
would realize more man-years from a cohort that included more of them than from a cohort with an average mix of educational expectations.

Increasing the percentage of recruits who expect more education seems especially worthwhile, given the figures for graduates who do not expect more education. The latter are the second least likely group to enlist and by far the most likely to leave by 35 months. Clearly, recruiters and personnel managers should recognize the riskiness of this group.

At present, we do not know the incremental costs and benefits of pursuing recruits who have a lower chance of attrition and of decreasing the number of attrition-prone enlistees. A controlled experiment may be needed to get that information, and our results should provide a backdrop for experimental design and application. It would be useful

to learn the incremental costs of recruiting seniors and graduates who do or do not expect more education, and further, whether the incremental costs of channeling them into hard-to-fill occupations differ across the groups. With such cost information—and with our results on attrition or results for more recent cohorts of enlistees—one could apply Baldwin and Daula's framework for estimating the cost of different quality mixes of recruits, subject to meeting the manning objective for first-term, trained personnel. Baldwin and Daula argue that a high-quality force may be more cost-effective than one might expect because even though high-quality enlistees are more costly to recruit, they are much more apt to complete their term. The longer average stay results in lower training costs, which largely consists of pay to trainees. In their example for infantrymen, the training cost savings substantially exceed the higher recruiting costs of moving to a higher-quality force. Similarly, experimentation and analysis may offer insight into the cost per first-term trained man-year for the groups we have identified. (One would not want to use the cost per *recruit* alone.) Moreover, Baldwin and Daula's framework could be extended to include the first-term reenlistment point and thereby account for the possibility that enlistees who expect more education are less likely to reenlist—clearly a relevant consideration.

Recruitment Strategies

Our suggested applications continue the theme that recruiting strategy should consider man-years, not just the total number of recruits and the percentage who are high quality. In addition to the experimentation just mentioned, implementation of our findings could involve

- Informing recruiters about attrition-risk factors;
- Developing a short battery of questions bearing on prospects' planning ability, diffuseness or specificity of career preferences, and educational expectations;
- Experimenting with minimum DEP waits;
- Coordinating attrition management with training and job performance assessment; and
- Simplifying and rationalizing attrition codes.

Recruiters already obtain the name, address, and phone number of high school seniors. This information helps recruiters identify and contact prospective recruits, target mailings about service opportunities and enlistment incentives, and follow up on prospects who do not enlist when they are seniors. Our results not only show how enlistment behavior differs for seniors and graduates but also provide workable indicators for distinguishing between better and worse prospects. Recruiters could

use these results to get the highest yield of better enlistees possible from their "portfolios" of prospects, subject to their recruiting goals.

To help recruiters obtain relevant information about each prospect, the services could develop a brief series of questions about planning ability, employment stability, career preferences, and educational expectations. The questions might be asked informally in conversation with a prospect. For instance, recruiters can ask about educational expectations when they tell prospects about the GI bill. Information from the questions would not necessarily be used to discourage high-risk prospects but to identify those who need more thorough career counseling. Such counseling might result in fewer enlistments, but those who go in should have more realistic expectations about the payoff of military service and be less likely to leave early. These people could also be earmarked for specialized personnel management after enlistment.

Experimenting with Longer DEP Times

The results suggest that attrition is higher among people who enter rashly and without firm career goals. Establishing a minimum time in DEP might give recruits time to think more carefully about the training slot they have chosen to enter—and more broadly about entering the service at all.[25] It would be naive to assume that arbitrarily lengthening time in DEP would turn people into more methodical planners or more productive workers. Rather, minimum DEP times would avoid precipitous behavior that would later be costly to both the service and the individual. Currently, DEP time depends on the demand (manpower requirements) for different skills and the supply of qualified recruits to fill it. The greater the supply, the longer the time in DEP. In general, recruits may choose any available training slot for which they qualify within 12 months of their enlistment date. This rule could be modified by setting minimum DEP times that vary by training slots. For popular skills, the minimum time would be irrelevant in practice because actual time would in most cases exceed it. However, it would increase the time for other skills. Although this longer wait may cost the service some recruits who are less sure of their decisions, it would conserve processing and training resources by "separating" such people early. The tradeoff is between fewer recruits and lower first-term attrition.[26]

Attrition Risk and Job Performance

We stated earlier that we do not know the incremental costs and benefits of pursuing recruits who have a lower chance of attrition and decreasing the number of attrition-prone enlistees. In addition, attrition

analysis is limited by its lack of information about enlistees' training and job performance. Attrition simply manifests the outflow of enlistees, without any systematic attempt to maintain data for analyzing whether the right people are going and staying. Beyond the obvious categories of "undesirables," there are no comprehensive definitions of who the "right" people are in each case. Analysis of attrition could proceed from a surer basis if the data used were enriched with information on performance, promotion, personnel management policy and practice, contextual variables (e.g., use of training on the job, housing, location, unit turbulence, pace of operations), and other factors.

Existing information about separation itself does little to explain why people are leaving. At present, there are about 70 Interservice Separation Codes for attrition that define reasons for separation. Because they are probably not applied systematically across services even within a service, these codes provide limited insight into the causes of a given separation. It is hard to tell whether separation is due to poor performance, poor attitude, or service manning constraints. The situation might improve if there were four or five broad categories, clearly defined protocols for implementing them, and occasional audits of their use.

Implications for Enlistment and Attrition Policy Research

The study illustrates the value of analyzing microdata (i.e., individual-level information) for predicting enlistment and attrition behavior. Our empirical results provide further knowledge of segmentation in the enlistment market and establish a systematic basis for predicting attrition among seniors and graduates who enlist or might enlist.

The results also demonstrate the usefulness of the choice-based sampling methodology we used. This methodology is an easy-to-use, inexpensive way of enriching samples with observations on rarely occurring choices. In our analysis, we were able to combine existing surveys, avoiding the cost of new data collection. However, even if new data collection is necessary, choice-based sampling greatly reduce collection costs because one can oversample the groups of interest. Random sampling would require a massive data collection effort to get samples of a similar size. Choice-based sampling could be used in efforts to study, for example, particular groups that are hard to recruit or hard to keep in the service, or particular occupations that are hard to fill.

Future research could clarify the role of educational benefits in attracting seniors and graduates: do such benefits differentially attract persons who expect more education, and are they less likely to reenlist?

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New microdata on enlistment and reenlistment are needed to answer these questions. In another vein, we frankly had expected to detect selectivity bias in the attrition equation. Why is a selection effect absent, especially given other evidence that some factors persist from preenlistment to first term? For instance, Jerald Bachman, Lee Sigelman, and Greg Diamond show that military personnel share "promilitary" attitudes; their study suggests that these attitudes often predate military service—those who join the military are more promilitary than their classmates.[27] Perhaps selection occurs *during* the recruitment process. Many youth never "apply" for service (i.e., take the Armed Service Vocational Aptitude Battery), and approximately half of those who apply do not subsequently enlist. Analysis could show why this occurs and to what extent the recruiter's role is prominent in encouraging applications and in mediating the transition from applicant to enlistee.

Notes

1. This paper concerns nonprior service, active duty enlistees. Attrition refers to leaving service at some point within 35 months of accession without completing one's term of service. A small number of two-year enlistees were dropped from the analysis, which focuses on terms of three or more years.

2. Richard Buddin, *Analysis of Early Military Attrition Behavior* (Santa Monica, Calif.: RAND, 1984), p. 62.

3. This paper draws on a longer technical analysis: John Antel, James R. Hosek, and Christine E. Peterson, *Military Enlistment and Attrition: An Analysis of Decision Reversal* (Santa Monica, Calif.: RAND, 1987).

4. Unless otherwise noted in the text, *graduates* refers to people who have received their high school diplomas but are not currently enrolled in a postsecondary institution (i.e., a two-year college, four-year college, or vocational or technical school).

5. Baldwin and Daula and Buddin come closest in extent to our list of explanatory variables. There are differences between Baldwin and Daula's analysis and ours. We analyze enlistment and attrition jointly; they focus exclusively on attrition. They pool data on high school graduate and nongraduate enlistees and on men and women; we treat only male graduate enlistees. They estimate survival curves; we fit sequential probit models of enlistment, 6-month attrition and enlistment, and 35-month attrition. They present results for selected Army occupational specialties (infantryman, clerk, vehicle operator); we pool data across all skills and services. Buddin uses AFEES data (see text), as do we, to study attrition after 6 months for high school graduates and dropouts, and he estimates

discriminant regressions. A comparison of findings appears in footnote 16. Robert H. Baldwin and Thomas V. Daula, "The Cost of High-Quality Recruits," *Armed Forces & Society* 11, 1 (Fall 1984): pp. 96-114; Buddin, *Military Attrition Behavior.*

6. John H. Faris, "Economic and Noneconomic Factors of Personnel Recruitment and Retention in the AVF," *Armed Forces & Society* 10, 2 (Winter 1984): pp. 252-253.

7. Ibid., pp. 255-256.

8. Herbert George Baker, "Antecareer Crisis: Military Recruiting and the Youthful Job Applicant," *Armed Forces & Society* 11, 4 (Summer 1985): pp. 565-580.

9. Boyan Jovanovic, "Job Matching and the Theory of Turnover," *Journal of Political Economy* 87, 5 (1979): pp. 972-990; Louis Wilde, "An Information-Theoretic Approach to Job Quits," in *Studies in the Economics of Search*, ed. S. A. Lippman and J. J. McCall (New York: North-Holland, 1979), pp. 35-52.

10. Baker argues for better vocational guidance, but it may be that there is no real substitute for experience on the job, and, if so, the return on more guidance could prove small. Baker, "Antecareer Crisis," p. 571.

11. Robert Leider, "Muddling Through Won't Do," in *The All-Volunteer Force and American Society*, ed. J. B. Keely (Charlottesville: University of Virginia Press, 1978), pp. 183-204. Faris takes issue with Leider, arguing that progressive "disaffection and disillusionment" may more likely account for posttraining attrition than the services' efforts to discharge the least fit. While one may or may not be sympathetic with Faris's viewpoint, it is certainly possible that individual unhappiness is a side effect of the services' efforts.

12. In contrast to random sampling, choice-based sampling selects individuals according to a given choice they have made. This technique allows oversampling of choices of interest that occur at low rates in the population at large. The oversampling is corrected during statistical estimation. We did not study those in college; because so few college students enlist, the sample size was inadequate for analysis. The great majority of post-high school enlistments are among nonstudents—the group we used.

13. This summary of findings on enlistments and attrition represents a continuum of work on these issues. For further discussion of enlistment with references to the literature, see James R. Hosek and Christine E. Peterson, *Enlistment Decisions of Young Men* (Santa Monica, Calif.: RAND, 1985).

14. We are making a distinction between joblessness—not being employed—and unemployment—not having a job but actively seeking one.

15. We also tested the effects of race and various local area variables that might influence enlistment. After we controlled for the effects of the other influences, we found that blacks are more likely to enlist, perhaps because they believe that the military has less discrimination—and thus better opportunities—than civilian life does. However, Hispanics are not more likely to enlist than nonblack non-Hispanics. Moreover, race had no correlation with attrition. For a list and discussion of the local area variables, see Antel, Hosek, and Peterson, *Military Enlistment and Attrition*, appendix C.

16. We find, along with Baldwin and Daula, that AFQT is negatively associated with attrition, but the effect is small and of limited practical value as a predictor of attrition. Baldwin and Daula find that years of education are negatively related to attrition; we find a negative but statistically insignificant coefficient on "some postsecondary education." Baldwin and Daula find that nonwhites are less likely to separate than whites; we, too, find this for blacks and for Hispanics relative to whites, but the effects are statistically insignificant. DEP participation is discussed in the text. Baldwin and Daula find that labor market experience— time between last schooling and enlistment—has little impact. We find a positive, statistically significant but small coefficient for this variable. Buddin finds that work history of enlistees before entering service noticeably affects attrition. A spell of unemployment in the year before enlistment is associated with high attrition; we find a similar result for both 6-month attrition and 35-month attrition. He further finds that persons who change jobs frequently are more likely to leave early, as are non-high school graduates relative to graduates. He tries many indicators of military job match quality as perceived by the enlistee at time of enlistment, but these have no significant impact; the measures include satisfaction with military job, satisfaction with the military itself, getting the job one pre- ferred, not qualifying for the desired kind of job, and having preenlistment knowl- edge of job qualifications. He finds lower early attrition for DEP participants, blacks, Hispanics, and younger enlistees.

17. This training averages 15 weeks but can last from two months to more than a year, depending on the specialty. In some cases, no advanced training is offered (e.g., for general detail personnel in the Navy).

18. Should there be disappointment, attrition may or may not occur. Job match theory says that separation results only when the total value of the job match becomes less than the opportunity values associated with separation, provided the transfer of value between the worker's and firm's shares of total value is costless. If value transfer is costly, then these costs must be included. Thus, in the military setting, attrition will not occur if the value of the job match exceeds the opportunity values plus value transfer costs. Gary S. Becker, Elisabeth M. Landes, and Robert T. Michael, "An Economic Analysis of Marital Instability," *Journal of Political Economy* 85, 6 (December 1977): pp. 1141-1187.

19. Faris, "Economic and Noneconomic Factors," p. 259.

20. Today, all enlistees enter a form of DEP because of the AIDS testing requirement. Recruits who would otherwise ship out immediately must, generally, wait a week to access until the results of their blood tests become available. In 1979 enlistees did not face this mandatory delay.

21. Buddin found that when losses from DEP were added to the data and treated as early attrition, the effect on attrition of being in DEP vanished. However, in that analysis only a DEP indicator was used and not length of DEP. Also, Buddin did not analyze seniors and graduates separately, and further, his data include high school dropouts. See Buddin, *Military Attrition Behavior.*

22. By defining the variable as number of months greater than one, we distinguish between seniors who enlist and enter service within one month (i.e., directly upon graduation) versus those who enlist earlier and wait to enter. The effect

of months in DEP intensifies much more for graduates than for seniors as the first term progresses. By 35 months, the graduate effect is about three-fourths greater than the senior effect.

23. Employment instability is defined by current joblessness or joblessness within the past 12 months. In preliminary empirical work, we found that these two variables had approximately the same effect on attrition. Thus, we combined them into a single indicator.

24. Figures are for 1979 and are based on tabulations from the sample rather than on predictions from the sequential probit model.

25. The current five-to-seven-day mandatory DEP required by AIDS testing may not provide sufficient time for such personal reevaluation. Experimentation would still be needed to determine if a week in DEP is adequate.

26. An experiment would be necessary to evaluate that tradeoff by establishing several minimum DEP waits. Such an experiment could be conducted on a small scale in a few test cells representing, say, 15 percent of the recruiting market and might last through an annual recruiting cycle. In this way, the experiment should not significantly affect the ability to meet overall recruiting goals and should not seriously disrupt the flow of recruits into existing training pipelines—even though lengthening DEP could increase DEP losses. Further, the experiment would be relatively costless because—unlike other strategies to increase enlistee quality (e.g., enlistment bonuses and educational benefits)—it would probably not require any additional recruiting resources.

27. Jerald G. Bachman, Lee Sigelman, and Greg Diamond, "Self-Selection, Socialization, and Distinctive Military Values: Attitudes of High School Seniors," *Armed Forces & Society* 13, 2 (Winter 1987): pp. 169-187.

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